

What is claimed is:

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B1 1. A method for storage handling of stackable storage objects, where the storage objects are supplied in an arrival stack, the storage objects are stored in at least three storage stacks, the storage objects are moved between the said arrival stack and the storage stacks by means of a collector provided with means for securing and releasing the storage objects; control unit provided with a processor controls the movements of the collector via a communications link and in accordance with instructions from a user, which instructions are input to the control unit via a user interface coupled thereto, upon arrival of storage objects in said arrival stack, the control unit is fed with information on the individual identity of each storage object, its type and its position in the arrival stack, wherein said instructions include withdrawal orders which are arranged in a withdrawal list in the control unit in the desired sequence, each withdrawal order concerning a storage object of a certain type, the method comprising the steps of:

a) the control unit searches for the first unmarked storage object which is requested in the withdrawal order lying next in the withdrawal list and which lies at the top of one of the said storage stacks and/or the arrival stack;

b) in an internal register, the control unit marks the storage object found in step a with a sequence number according to the withdrawal order desired in the withdrawal sequence;

repeating steps a and b as long as there are requested unmarked storage objects;

c) the control unit defines the storage stack which has the lowest unmarked storage object above a storage object marked in step b and assigns this storage stack a first category (A) and assigns other storage stacks a second category (B);

d) if in the storage stack of the first category (A) there are one or more unmarked storage objects above the lowest marked storage object, the collector moves an unmarked or a marked storage object to a storage stack of the said second category (B);

repeating step d until no unmarked storage objects are above the said lowest marked storage object in the storage stack of the first category (A);

e) if, in any storage stack of the second category (B), there is a marked storage object, the collector moves from the lowest storage stack of the said category (B), which contains a marked storage object, an unmarked storage object in this storage stack to a second storage stack of the same category (B), or a marked storage object to a storage stack of the said first category (A);

repeating step e until all the marked storage objects are in the storage stack of the first category (A);

f) the collector moves storage objects lying in the arrival stack to one or more storage stacks of the second category (B);

repeating step f until the arrival stack is empty;

g) the collector moves the uppermost marked storage object from the storage stack of the first category (A) to a storage stack of the second category (B) on which a marked storage object, with the next higher sequence number in relation to the storage object which is moved, lies at the top;

h) if the condition for moving according to step g is not satisfied, the collector moves the uppermost marked storage object from the storage stack of the first category (A) to a storage stack of the second category (B) which has no marked storage object;

i) if the condition for moving according to step h is not satisfied, the collector moves the

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uppermost marked storage object from the storage stack of the first category (A) to that storage stack of the second category (B) whose uppermost marked storage object has the lowest sequence number in relation to the uppermost marked storage objects of the other storage stacks of the same category (B);

repeating steps g-i until the storage stack of the first category (A) has no marked storage objects;

j) if all the marked storage objects lie in storage stacks of the second category (B), on marked storage objects with a higher sequence number than their own sequence number or on an unmarked storage object, the sorting is terminated, otherwise the sorting continues at step k;

k) the collector moves the storage object which, among the uppermost marked storage objects in the storage stacks of the second category (B) has a sequence number which is next higher than the sequence number of the storage object lying at the top of the storage stack of the first category (A), to the storage stack of the first category (A);

l) if the condition for moving in accordance with step k is not satisfied, the collector moves the storage object which, among the uppermost marked storage objects in the storage stacks of the second category (B) has the lowest sequence number, back to the storage stack of the first category (A); and

repeating steps k and l until all the marked storage objects are lying in the storage stack of the first category (A).

2. A method for sorting and stacking stackable storage objects where the storage objects consist of at least three stacks, the method comprising the steps of:

identifying and marking each storage object with a sequence number for each object in a withdrawal order;

identifying the lowest unmarked storage object above a mark storage object in each stack;

categorizing the stack containing the identified lowest unmarked storage object as a first
stack;

categorizing each remaining stack as a second stack;

moving each storage object from the first stack onto one or more of the second stacks
until the identified lowest unmarked storage object is on top of the first stack;

stack;

sorting and moving all of the marked storage objects from the second stacks onto the first

moving each of the storage objects in the arrival stack to one or more second stacks;

moving each of the marked storage objects to the second stacks from the first stack;

terminating the method when each of the marked storage objects in each of the second stacks has a lower sequential number than the marked storage object below the marked storage object in a second stack;

rearranging the order of the marked storage objects in the first stack; and .

repeating the steps of moving each of the marked storage objects to the second stacks from the first stack and rearranging the order of the marked storage objects in the first stack until each of the marked storage objects in each of the second stacks has a lower sequential number than the marked storage object below the marked storage object in a second stack.

3. The method according to claim 2, wherein the sorting and moving step further comprises the steps of:

selecting a second stack containing at least one marked storage object;

moving the storage object on top of the selected second stack to the first stack when the top storage object is a marked storage object and moving the top storage object to another second stack when the top storage object is an unmarked object until the all of the marked storage objects in the selected second stack are in the first stack; and

continuing to select second stacks and move storage objects until all of the marked storage objects are in the first stack.

4. The method according to claim 3, wherein the selection of the second stacks containing at least one marked storage object is based on the height of the second stacks with the second stack containing the at least one marked storage object having the lowest height being selected.

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5. The method according to claim 1, wherein the step of moving each of the marked storage objects to the second stacks from the first stack, further comprises the steps of:

moving the top marked storage object from the first stack to the second storage stack having the next highest sequence number with respect to the marked storage object being moved;

moving the top marked storage object from the first stack to the second storage second stack containing no marked storage objects when the storage object being moved has a higher sequence number than the sequential numbers of the marked storage objects on top of each of the second stacks; and

moving the top marked storage object from the first stack to the second storage stack containing the top marked storage object having the lowest sequential number of all of the top marked storage objects on the second stacks and each of the second stacks contains a marked storage object.

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6. The method according to claim 2, wherein the step of rearranging the order of the marked storage objects in the first stack further comprises the steps of:

moving the top marked storage object from the first stack to the second stack having a marked storage object on top of the second stack having a marked storage object on top with the next highest sequential number compared to the sequential number of the top marked storage object on top of the first stack;

moving the top marked storage object from the first stack to one of the second stacks having an unmarked storage object on top when the sequential number of the marked storage object on top of the first stack is higher than the sequential number of the marked storage object on top of each second stack; and

moving the top marked storage object from the first stack to one of the second stacks having an unmarked storage object on top when all of the second stacks have unmarked storage objects on top.

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